

ICES AGDSS REPORT 2011

ICES ADVISORY COMMITTEE

ICES 2011 / ACOM:54

Report of the *Ad hoc* Group on Deep-sea Survey (AGDSS)

3 March 2011



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1 Requirement and need for fisheries independent deep-water surveys in the NE Atlantic

1.1 Term of Reference

Evaluate the need of fisheries independent data and propose solution for the near future based on WGNEACS work, in collaboration with WGDEC, WGDEEP and WGEF.

This ToR has been addressed jointly by WGDEEP, WGDEC and WGEF.

1.2 Background

Under the current MoU between ICES and the EC, ICES is required to provide fisheries management advice for deep-water fish stocks in relation to the MSY framework. ICES, as well as EU project DeepFishMan, have made considerable progress in assessing deep-water stocks however progress has frequently been hampered by the lack of appropriate fisheries independent dataserie s leaving assessments heavily dependent on abundance indices derived from commercial landings data. Problems related to the use of commercial cpue series are well known but may be particularly acute in the case of deep-water fisheries because of the large spatial extent of stocks relative to fishing areas, the effects of depth on catch rates, and potential for sequential depletion of local aggregations. Additionally, the introduction of very low or zero TACs for a number of stocks has led to the truncation of some commercial cpue series and reduction in the quality of others, further increasing the need for fisheries independent data in order to monitor stock recovery.

In addition to the requirement for abundance indices, the DCF ecosystem indicators, the Marine Strategy Framework Directive and OSPAR's Quality Status report create a requirement for data to monitor wider ecosystem quality. Indicators of deep-water fish biodiversity and community structure can only be reliably generated from trawl survey time-series. There is a need also for size-based indicators to be developed; information on individual weights and lengths of the species that make up the community allow potential effects of fishing to be assessed quantitatively. The MSFD will also require information on benthic diversity, vulnerable marine ecosystems and seabed integrity. Thus in addition to traditional survey methods, future deep-water surveys will need to utilize a range of acoustic, televisual and novel sampling approaches.

Dedicated deep-water surveys have been conducted by a number of countries however these are usually limited in their spatial extent and may not cover the full area of the stocks' distribution. Lack of adequate national and/or DCF funding has resulted in the discontinuation of some of these surveys and consequent truncation of dataserie s.

In 2007, ICES received requests from the EU Regional Coordination Meeting for the NE Atlantic and NEAFC to consider coordination and development of deep-water surveys for the NE Atlantic. In response ICES set up an international deep-water survey planning group, the Planning Group on the North-east Atlantic Continental Slope Surveys (PGNEACS) in 2008. PGNEACS reviewed existing NEA deep-water and slope surveys, and developed a proposal for international coordination.

1.3 Response to request

For the purpose of single-stock assessment, details of the data needed, survey periodicity and how they can be collected are summarized in Table 1. Colour coding indicates whether there are already existing surveys which adequately address these data requirements (green shading), surveys that are limited in their suitability by not covering the core stock unit adequately (orange shading) or if there are no current surveys present to provide any data (red shading). The table also gives details on what additional survey effort is required to address the deficiencies and how this would improve current stock assessments.

From Table 1 it is apparent, that for the majority of deep-water stocks, fished by EU fleets, there are currently no adequate surveys that provide sufficient data for stock assessment purposes.

The additional survey requirements to address stock assessment and ecosystem monitoring needs are compared with the current situation and are described in more detail below.

1.3.1 Proposed deep-water trawl survey in Vb, VI, VII and XIIb

Following recommendation from WGDEEP and WGDEC in 2007, WGNEACS (2009 and 2010) proposed a coordinated deep-water survey to cover ICES Subareas VI and VII and Divisions Vb and XIIb which incorporate the existing deep-water trawl survey from Scotland and the now discontinued survey from Ireland. ADGSS (i.e. WGDEEP, WGDEC and WGEF) have evaluated the survey design and consider that the proposed survey will meet current and near future data requirements for stock assessment and some ecosystem monitoring in this region. However, the area proposed in the Bay of Biscay is largely unsuitable for deep-water trawling. Consequently this area should be moved to the southern longline survey (see Section 1.3.2).

The area covered by the proposed survey corresponds to the current perception of the distribution of the main commercial deep-water stocks in this region. The survey design is optimized in order to maintain available time-series (Scottish and discontinued Irish deep-water trawl surveys) and provide representative abundance indices by following a depth and area stratified sampling design. Additional biological sampling requirements specified in Table 1 should be fully satisfied by the proposed survey methodology. All species will be identified, recorded and measured and this will provide appropriate data for the development and monitoring of ecosystem indicators.

WGDEEP, WGDEC and WGEF concur with the WGNEACS recommendation that surveys be carried out annually for the first five years in order to rapidly build the time-series after which the survey can be biennial to coincide with the two year management cycle for deep-water species.

The additional survey effort allocation and methodologies for the deep-water trawl survey in Vb, VI, VII and XIIb has been described in PGNEACS 2009 and WGNEACS 2010 and are summarized here.

The proposed survey should cover four geographical regions, only one of which is currently surveyed (Scottish slope), and these should be further subdivided into sampling areas that can be trawled (as documented in ICES 2009). The proposed sampling strategy is summarized by geographical region and depth range in Table 2.

Table 2. Survey sampling strategy by area for the proposed deep-water trawl survey (from ICES 2009).

Region	N sample areas	Depth range	Total number of Hauls per region
Scottish Slope	4	500–1800	20
Northern	6	500–1500	24
Rockall and Hatton Banks	8	500–1800	36
Irish slope and Porcupine	4	500–1800	20
Total			100

The total area coverage of the proposed survey is presented in Figure 1.

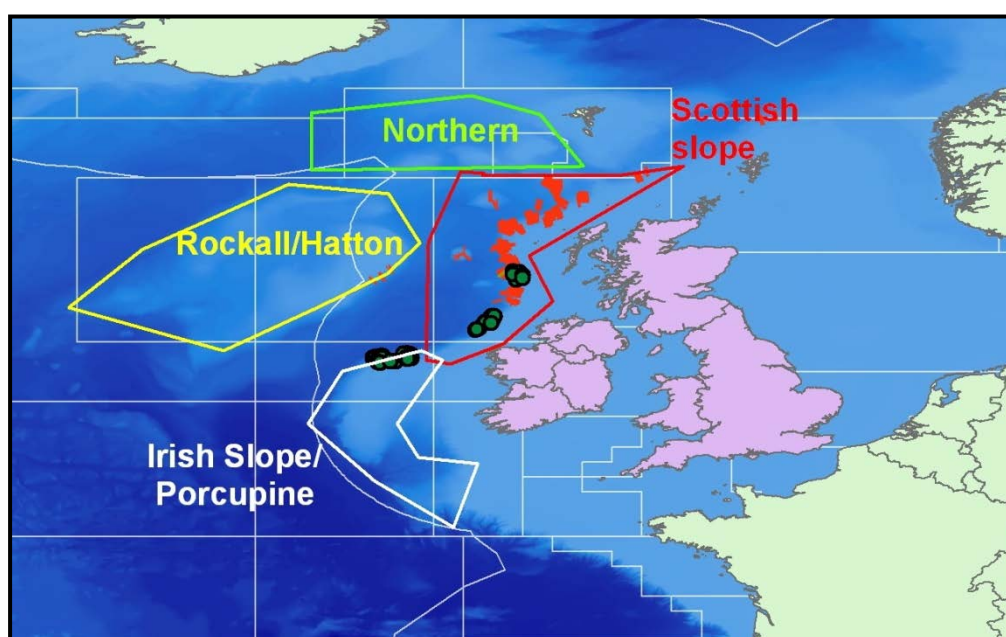


Figure 1. Area coverage of the proposed deep-water trawl survey (WGNEACS, 2010). Red symbols = trawl hauls of the existing Scottish Deep-water survey (1998+), green symbols = trawl hauls from discontinued Irish Trawl survey (2006–2009) and polygons represent proposed sample regions.

The surveys require large research vessels such as RV Scotia, RV Celtic Explorer, RV Thalassa, and RV GO Sars because commercial vessels generally do not carry enough warp to fish to the bathyl limits of the species range. Vessels can expect to complete 4–5 one-hour hauls per day and this gives a duration of 20–25 fishing days plus steaming time. At least two ships are necessary to cover the entire survey area.

1.3.2 Proposed international longline survey in the southern area (ICES Sub-area VIII and Division IXa)

For deep-water surveys in VIII and IXa, trawl surveys are not appropriate due to the rough bottom topography. A previous trawl survey, discontinued in 2003, in this area did not allow to properly sample the main commercial deep-water species. Therefore an internationally coordinated longline survey was proposed by WGNEACS 2009 and 2010. WGDEEP, WGDEC and WGEF have evaluated the survey design and consider that the proposed survey will meet current and near future data requirements

for stock assessment and ecosystem monitoring in this region. WGDEEP further recommend that the survey should be expanded to cover the Bay of Biscay (figure X).

The main objective of the survey is to produce abundance estimates for black scabbardfish and deep-water sharks. The TAC for the latter is currently set to zero and the long-term recovery can only be monitored from survey indicators.

In Division IXa, fishing hauls will be randomly set within each cell of a regular grid established for the Portuguese slope. The sampling effort will be of two longline sets per day of ca. 10 hours soak time each. Relative depth and area stratified abundance indices will be computed, together with other population indicators (length distribution, sex ratio, maturity, age distribution). In Subarea VIII, a similar sampling grid will be developed and a lower intensity will be applied owing to the insignificant landings of deep-water species.

As a preliminary estimate, 40 fishing days of 15–25 m long chartered commercial longliners will be required to cover Division IXa and Subarea VIII.

1.3.3 Proposed longline survey in the southern area (ICES Subdivision Xa2)

Since 1995, a longline spring survey has been conducted annually in ICES Division Xa2. The surveyed area covers around 70% of the area of distribution of main demersal species of red (blackspot) sea bream, blue-mouth redfish and alfonosinos. The survey provides abundance and length distribution data. Indices produced from this survey have been available to WGDEEP and WKDEEP. WKDEEP concluded that interannual variability in the cpue index for red (blackspot) sea bream may be a result of factors relating to the spatial distribution of the stock that are not adequately accounted for in the survey design.

Spatial extension of the survey to cover offshore seamounts will facilitate coverage of the entire area of the stocks and may be expected to improve confidence in the use of survey indices for stock assessment.

Additional resource requirements to meet this objective are currently being considered by DOP.

1.4 How this would improve the current situation (identification of the added value for stock assessment coming from the extension and/or harmonization of the surveys)?

Table 1 identifies the expected input of data from expanded/new fisheries surveys into stock assessments. WGDEEP, WGDEC and WGEF consider that the survey proposed by WGNEACS will satisfy all of these requirements.

For the main commercial deep-water species such as black scabbard, roundnose grenadier and blue ling, it is anticipated that the data will provide spatially and depth stratified abundance indices and length/age distribution. In some cases, e.g. blue ling, it is hoped that the data will also allow the estimation of recruitment indices. For stocks, that are currently severely depleted and have TACs set at zero, such as the deep-water sharks and orange roughy, it is anticipated that the surveys would be the main data source to monitor the long-term recovery.

For the provision of deep-water ecosystem advice three key uses of data from deep-water surveys were identified:

- a) mapping of the spatial and bathyal distribution of non commercial species;

- b) provision of indices of biodiversity and any other ecosystem indicators as required by DCF, MSFD, OSPAR;
- c) addressing specific research and monitoring needs such as stock identification, habitat mapping and contaminant monitoring.

There will be an increasing need to research and monitor the status of deep-water ecosystems within the EEZ of the EC as part of the Marine Strategy Framework Directive (MSFD). This requires the development of indicators of ecological quality or 'good environmental status' (GES). Qualitative descriptor No. 1 of the MSFD's for GES is maintaining biological diversity. Indicators of deep-water fish biodiversity have been generated from scientific trawl survey time-series and used to assess spatial and temporal variability in deep-water fish communities (Campbell *et al.*, 2011). Size based indicators are also being developed; information on individual weights and lengths of the species that make up the community allow potential effects of fishing to be assessed quantitatively. Such indicators track changes in community structure and the proportional representation of species.

For deep-water benthos, while bycatch records are informative, the fishing gears are not designed to sample benthic animals. Consequently data cannot be used in the same way as for the fish community. Benthic sledges and beam trawls are one way to sample benthos more effectively, but clearly these are not desirable in deep-water ecosystems where they cause significant adverse impacts. In cases where this is clearly the case, alternative non-destructive methods need to be developed and adopted, such as ROV and or drop frame/towed camera surveys. Future deep-water surveys therefore need to have a multidisciplinary design in which the information is gained is appropriate to the impact the sampling is likely to have on the VMEs.

Deep-water surveys also provide the platform to collect acoustic and physical data on the seabed. Such data can be extremely valuable for modelling the likelihood of the presence of different types of deep-water VMEs such as coral reefs or seapen/mud habitats.

As well as targeted data collection, deep-water surveys are important platforms to collect samples for further information on stock discrimination, foodwebs and other projects outside the Data Collection Framework. In recent years, several PhD projects have used samples collected by deep-water surveys in the NE Atlantic. Genetic samples from Portuguese dogfish collected on Irish, Scottish, Portuguese and US surveys have been used to assess the level of mixing within populations from distinct fishing areas. Other theses have looked at dentition as a method of species discrimination, bioluminescence in deep-water fish, and elasmobranch cartilage as novel polymers.

Muscle samples taken from 30 different deep-water species to the west of Scotland and west of Ireland have been used in stable isotope studies to determine the trophic levels of these species within the ecosystem.

Studies such as these show the value that can be incidentally derived from surveys that have other primary objectives. Several projects are now stalled due to the lack of availability of new samples, particularly now that commercial fishing has ended.

Additional biological data (e.g. genetic samples, blood for endocrinology, parasites and tissues for contaminants) will be collected depending on monitoring requirements and use in research projects. The surveys will include a multidisciplinary component with oceanographic data, salinity and temperature collected for sensors attached and video observations from a small towed camera (one tow per day).

1.5 Survey coordination and data management

It is anticipated that the proposed surveys are internationally coordinated by ICES WGNEACS, whereby the Working Group will be the forum for coordination, method review as well as quality control and management of data. Survey data will be housed in the DATRAS database. In relation to the longline surveys, institutes will keep dedicated database as DATRAS may not accommodate all information relevant to longlines.

References

- Campbell, N., Neat, F., Burns, F. and Kunzlik, P. 2011. Species richness, taxonomic diversity, and taxonomic distinctness of the deep-water demersal fish community on the Northeast Atlantic continental slope (ICES Subdivision VIa). *ICES Journal of Marine Science*, 68(2): 365–376.
- Neat, F. and Burns, F. 2010. Stable abundance, but changing size structure in grenadier fishes (Macrouridae) over a decade (1998–2008) in which deep-water fisheries became regulated. *Deep Sea Research (Part I, Oceanographic Research Papers)*. Vol. 57, no. 3, pp. 434–440. Mar 2010.
- PGNEACS. 2009. Report of the Planning Group on the Northeast Atlantic Continental Slope Surveys. 9–11 June 2009. Tromsø, Norway. 59pp. ICES CM 2009/LRC:03.
- WGDEEP. 2010. Report of the Working Group on the Biology and Assessment of Deep-sea Fisheries Resources. 7–13 April 2010. Copenhagen. Denmark. 613pp. ICES CM 2010/ACOM:17.
- WGEF. 2010. Report of the Working Group on Elasmobranch Fishes. 22–29 June 2010. Horta, Portugal. 560 pp. ICES CM 2010/ACOM:19.
- WKDEEP. 2010. Report of the Benchmark Workshop on Deep-water Species. 17–24 February 2010. Copenhagen, Denmark. 247pp. ICES CM 2010/ACOM:38.

Table 1. Review of data requirements for single-stock assessment for the main commercial deep-water species exploited by EU fleets. Letter coding in data requirement column are B=biomass, N=number, L=length, M=maturity, S=sex. Colour coding of table indicates existing surveys addressing data needs (green shading), surveys with limited suitability due to partial stock coverage (orange shading), no surveys present to provide required data (red shading).

Species	Stock area	Depth	Data requirements	Periodicity	How produced?	Additional survey requirements	expected input into assessments
<i>Aphanopus carbo</i>	Vb, XIIb, VI, VII	500 - 1700m	B, N, L, A, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in Vb, VI, VII, XIIb	expansion of current spatial survey coverage to stock area	Spatially and depth stratified abundance index and length/age distribution,
<i>Aphanopus carbo</i>	VIII, IX	500 - 1700m	B, N, L, A, M, S	Annually for 5 years, then biennially	Deepwater longline survey in VIII, IX	New deepwater long line survey	Spatially and depth stratified abundance index and length/age distribution,
<i>Aphanopus carbo</i>	I, II, IIIa, IV, Va, X, XIV	500 - 1700m	B, N, L, A, M, S	Annually for 5 years, then biennially	Deepwater longline survey in X as no significant catches in other areas	New deepwater long line survey	Spatially and depth stratified abundance index and length/age distribution,
<i>Coryphaenoides rupestris</i>	Vb, XIIb, VI, VII	400 - 1800m	B, N, L, (A), (M), (S)	Annually for 5 years, then biennially	Deepwater trawl survey in Vb, VI, VII, XIIb	expansion of current spatial survey coverage to stock area	Spatially and depth stratified abundance index and length/age distribution,
<i>Molva dypterygia</i>	Vb, VI, VII	300 - 1500m	B, N, L, A, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in Vb, VI, VII	expansion of current spatial survey coverage to stock area	Spatially and depth stratified abundance index and length/age distribution, recruitment index
<i>Brosme brosme</i>	Vlb	100-1000m	B, N, L, A, M, S	Annually for 5 years, then biennially	Rockall haddock and Rockall monkfish surveys		Spatially and depth stratified abundance index and length/age distribution,
<i>Hoplostethus atlanticus</i>	VI	500 - 1550m	B, N, L, (M), (S)	Annually for 5 years, then biennially	Deepwater trawl survey in VI	expansion of current spatial survey coverage to stock area	Monitoring of the long term recovery of the stock with indicators, possible recruit index
<i>Hoplostethus atlanticus</i>	VII	501 - 1550m	B, N, L, (M), (S)	Annually for 5 years, then biennially	Deepwater trawl survey in VII	New deepwater trawl survey	Monitoring of the long term recovery of the stock with indicators, possible recruit index
<i>Phycis blennoides</i>	VI, VII, XII	200 - 1100m	B, N, L, S	Annually for 5 years, then biennially	IBTS and deepwater trawl survey in VI, VII	expansion of current spatial survey coverage to stock area	Spatially and depth stratified abundance index and length distribution, recruit index
<i>Phycis blennoides</i>	VIII, IX	200 - 1100m	B, N, L, S	Annually for 5 years, then biennially	IBTS and deepwater longline survey in VIII and IX	expansion of current spatial survey coverage to stock area	Spatially and depth stratified abundance index and length distribution, recruit index
<i>Phycis blennoides</i>	X	200 - 1100m	B, N, L, S	Annually for 5 years, then biennially	deepwater longline survey in X	New deepwater long line survey	Spatially and depth stratified abundance index and length distribution, recruit index
<i>Pagellus bogaraveo</i>	VI, VII, VIII	30-800m	B, N, L, A, M, S	Annually for 5 years, then biennially	IBTS		Monitoring of the long term recovery of the stock with indicators
<i>Pagellus bogaraveo</i>	IX	200 - 800m	B, N, L, A,	Annually for 5 years, then biennially	Proposal under development	Proposal under development	-
<i>Pagellus bogaraveo</i>	X	200 - 800m	B, N, L, A, M, S	Annually for 5 years, then biennially	deepwater long line survey	expand survey to offshore areas (seamounts)	Spatially and depth stratified abundance index and length distribution,
<i>Centrophorus squamosus</i>	Global distribution, all ICES areas except northern seas	300 - 1800m	B, N, L, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in V, VI, VII, XIIb and deepwater long line survey in VIII, IX and X	expansion of current spatial survey coverage to stock area and new long line survey in VIII, IX and X	Monitoring of the long term recovery of the stock with indicators
<i>Centroscymnus coeleolepis</i>	Global distribution, all ICES areas except northern seas	500 - 1800m	B, N, L, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in V, VI, VII, XIIb and deepwater long line survey in VIII, IX and X	expansion of current spatial survey coverage to stock area and new long line survey in VIII, IX and X	Monitoring of the long term recovery of the stock with indicators
other deepwater sharks as given Annex 1 of deepwater licensing regulation 2347 /2002	Global distribution, all ICES areas except northern seas	200 - 1800m	B, N, L, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in V, VI, VII, XIIb and deepwater long line survey in VIII, IX and X	expansion of current spatial survey coverage to stock area and new long line survey in VIII, IX and X	Monitoring of the long term recovery of the stock with indicators
<i>Argentina silus</i>	I, II, IIIa, IV, Vb, VI, VII, VIII, IX, X, XII, XIV	0-1000m	B, N, L, A, M, S	Annually for 5 years, then biennially	Deepwater trawl survey in Vb, VI, VII, and IBTS	expansion of current spatial survey coverage to stock area Vb, Vi and VII	Spatially and depth stratified abundance index and length and age distribution, recruit index

check MOU with ICES in terms of deepwater sharks

Monitoring of the long term recovery of the stock with indicators,

Annex 1: Participants list

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Annex 2: Technical minutes of the Review Group of Deep-sea Surveys

- RGDSS
- By correspondence 23 March 2011
- Participants: Bill Karp (Chair), Doug Beare and Dave Reid. Tom Blasdale (WGDEEP Co-chair), Phil Large (WGDEEP Co-chair), Francis Neat (WGDEC Chair) and Graham Johnston (WGEF Chair). Cristina Morgado (Secretariat).
- Review of the ICES *Ad hoc* Group on Deep-sea Surveys (AGDSS)

General

The Review Group considered the following special request:

ICES is requested to evaluate the need of fisheries independent data and propose solution for the near future, namely:

- 1) compile as many details as possible on the data needed and their periodicity;
- 2) evaluate the need for additional work compared with the current situation; and
- 3) identify the added value for stock assessment coming from the extension and/or harmonization of the current surveys.

In general, the Review Group found the report of the *Ad hoc* Group on Deep-sea Surveys (ADGSS) to be well written and responsive to the terms of reference (TOR). Some specific concerns were identified, however, and the need for additional information and/or elaboration of some of the issues raised in the report was noted. Details are provided in the section-by-section review.

The Review Group wishes to commend the members of AGDSS for the quality and comprehensiveness of the report, and for the considerable effort that must have been expended to draft the document.

Section 1.1

This section simply states the ToR and identifies the EGs involved in drafting the document. No further comments are necessary.

Section 1.2 (Background)

This short section provides the context and basis for the request. This section is comprehensive and complete.

Specific comments:

- Regarding Table 1. It would be helpful to provide more information about what species are targeted commercially, and which species are assessed and what form those 'assessments' currently take ? (in the table or as text).
- Regarding "the effects of depth on catch rates" (Paragraph 1, line 9) comment - this comment is rather vague and should be clarified. Does this mean that survey data can be biased with respect to depth?

- Regarding comment on very low or zero TACs (Para 1, line 11) - Do we know anything about whether the fishermen are actually not landing these species. Are they being discarded? Or landed as something else?

Section 1.3 (Response to request)

Section 1.3 simply introduces several subsections which respond to specific aspects of the request. This section is complete and appropriate, although one specific concern was identified:

- This relates to use of the term “adequately address” in the first paragraph of the section. It’s not clear how the authors determine what is, and what is not adequate. It is important to distinguish between ‘adequately addressing the data requirements’ which is just having some useful data and ‘having adequate data for a formal stock assessment’. Some elaboration would be helpful, although we realize that this is a complex issue.

Section 1.3.1 (Proposed deep-water trawl survey in Vb, VI, VII and XIIb)

This section provides the rationale for the recommended trawl survey and detailed information about survey design and methodology. This section is quite comprehensive and very responsive to the ToR. However, it lacks important detail in some aspects.

Specific comments:

- Paragraph 1. How was the evaluation done and were “current and future” needs defined?
- Paragraph 1. Raises problems of comparison between trawl and longline surveys. These are very different in nature with potentially radically differing selectivities, etc. How will these differences be reconciled?
- Paragraph 2. How was the optimization process accomplished?
- Paragraph 3. What are the trade-offs between annual and biennial surveys for the first few cycles? If money was only available to do the survey every second year, would it still be worthwhile? How might survey frequency be expected to impact assessment quality?
- Paragraph 4. (use of term “central European deep-water survey”) I’m sure this is the same survey but they should use the same nomenclature.¹
- Table 2. Supporting information is lacking. Another example of not providing much background information. How did they determine sample sizes and what are the trade-offs between different designs (sampling intensity) and uncertainty in abundance estimates and assessments? We realize that this is a complex issue but it does merit some further elaboration and discussion in the text.
- Paragraph 6. Is it really necessary to fish for an hour? Work by Pennington and other indicates that you don’t lose much (e.g. spatial) information from shorter tows.
- Paragraph 6. Given the survey area it seems ambitious that two ships are enough. A bit of bad weather in this area and your plans are scuppered.

¹ This recommendation was corrected in the report.

- Paragraph 6. Is the survey protocol sufficiently standardized, and is this understood?

Section 1.3.2 Proposed international longline survey in the southern area (ICES Subarea VIII and Division IXa)

This section provides a description of a longline survey that was proposed by WGNEACS in 2009. This section is brief but provides a good overview of the proposed survey.

Specific comments:

- Paragraph 1. More information on methodology would be helpful.
- Paragraph 3. Do the landings reflect reduced effort or reduced abundance?

Section 1.3.3 Proposed longline survey in the southern area (ICES Subdivision Xa2)

This section describes an existing survey that has been in place since 1995, although the term “proposed” is used in the heading. The authors express concerns about the quality of data produced by this survey and whether this current survey actually produces data that are useful relative to the ToR. Furthermore, it is not clear how the suggested spatial extension of this survey would “improve confidence in the use of survey indices for stock assessment”.

Specific comment:

- This section does not provide sufficient information to evaluate the usefulness of the current survey or the proposed extension.

Section 1.3.4 Tagging survey proposal in IXa (Strait of Gibraltar)²

This section provides a very brief description of a tagging survey which would take place in the Strait of Gibraltar. Even though it is evident that survey-based abundance estimates would be very difficult to obtain for this area, it is not apparent that this type of study would be fully responsive to the ToR or cost-effective. The study would likely focus on only one species and would not provide distribution or ecosystem information. Furthermore, even if successful, it would only provide a single abundance estimate and would not support the need for time-series information. We recommend that this section be removed unless the authors can provide a much more detailed argument to support this work relative to the ToR.

Section 1.4 How this would improve the current situation (identification of the added value for stock assessment coming from the extension and/or harmonization of the surveys)?

This section describes the expected contribution that these surveys would make to stock assessments for the species of concern. Spatially and depth stratified abundance indices would be provided for key species and data that would support estimation of recruitment indices would be provided in some cases. One important point is the particular importance of these kinds of data for supporting assessments

² The proposal of a tagging survey was removed from the AGDSS, following the recommendation from the RGDSS and also approval from AGDSS experts.

of species which occur infrequently in commercial catches. In addition to addressing stock assessment information needs, this section also considers information needs to support ecosystem advice as required by DCF, MSFD, and OSPAR and discusses the extent to which primary survey data, or ancillary data collected during surveys would be responsive to these needs. A comprehensive and useful perspective is provided, although the discussion is rather general in nature. Considerably more effort would be required to determine information requirements for specific types of ecosystem advice, and the extent to which these requirements could be met using the survey design described earlier in the document. This would be outside the scope of work for the AGDSS.

Specific comments:

- Paragraph 2 (bullet b) - Biodiversity information can, perhaps, be obtained from trawl survey data e, but longline data will be less useful in this context. Other ecosystem indicators would probably require additional data collection and mechanisms, e.g. CTD, beam trawls, grabs which are all slow to obtain due to water depth.
- Paragraph 2 (bullet c) - All possible, habitat mapping could make use of detailed multibeam surveying on the shelf slope. But ground-truth and contaminant data would require additional grab/TV survey effort.
- Paragraph 3 - It would be helpful to see more discussion of the types of data to be collected and the specific indicators/indices. Would the temporal and spatial scale of the surveys be appropriate to support these ecosystem information needs?
- Paragraph 5 (second sentence) - this sentence is difficult to understand. Please clarify.

Section 1.5 Survey coordination and data management

This section is very brief and speaks to the roles of WGNEACS as a forum for coordination, method review, quality control, and data management. One area of concern is that DATRAS is unable to manage longline survey data at present so this would need to be done elsewhere.

Specific Comments:

- The workload associated with coordinating this survey will be substantial. It is important to confirm that WGNEACS is willing and able to handle this.
- Consideration should be given to developing the ability to manage longline survey data within DATRAS.

General comments

This is a well ordered report addressing straightforward Terms of Reference. The reviewers also believe that more information is urgently required on the status of deep-water fisheries. The context regarding the need for advice is clear. As noted below, we have suggested clarifications and additional detail would have been helpful in several sections of the report. However, we do not believe it is necessary to respond to these suggestions before moving forward with the advisory process because we do not think they would change the nature of the advice in a material way.

Technical comments

No complicated technical methodologies (e.g. stock assessments, statistical models) are tackled by the authors of this report. It is a 'qualitative appraisal' of a specific situation by experts and not a 'quantitative analysis,' and we have reviewed the report in that context. Hence there is nothing 'wrong' in the report and there are no obvious errors. Where aspects of the text are unclear we have commented above. Clarifications and elaborations along the lines noted above would be helpful but are not essential because they will not change the recommendations for advice.

We have, however, identified two technical issues which we would like to highlight. The first of these concerns the broad recommendation that both longline and bottom-trawl surveys should be used to address information needs for stock assessment. We note that incorporation of indices from different types of surveys into a single-stock assessment can be technically challenging although we are aware that this is being done routinely in many ICES stock assessments. So we recommend that this aspect be given careful consideration, perhaps by convening a workshop on this topic before the first stock assessments that utilize data from these new surveys.

Our second concern relates to the recommendation for a tagging survey in the Strait of Gibraltar (Section 1.3.4). While we recognize the need for information from this area, and the difficulties involved in carrying out traditional stock assessment surveys, we do not think that the proposed tagging study would be appropriate or responsive to the ToRs. It may be appropriate to investigate other possibilities, such as acoustic surveys or use of underwater video systems on a pilot-study basis. But we do not recommend implementation of the proposed tagging study.

Conclusions

The reviewers (members of RGDSS) have completed their review of this report and are satisfied that it is comprehensive and responsive to the ToRs. We conclude that the recommendations in the report provide a sound basis for the provision of advice, with the exception of the recommendation for a tagging study. We do not recommend implementation of the proposed tagging study for reasons explained above³. Furthermore, we do recommend that particular attention be paid to the challenges associated with incorporation of indices from different types of surveys into the stock assessment process.

We have made several suggestions for clarification and elaboration within the AGDSS report. While these would, we think, improve the quality of the report itself, they would not markedly change the recommendations within the AGDSS report or the outcome of this review.

³ The proposal of a tagging survey was removed from the AGDSS, following the recommendation from the RGDSS and also approval from AGDSS experts.